tween 1,800 and 1,900 students in the spring term. The number of students entering the College of Civil Engineering and the College of Agriculture shows large percentages of increase, and the attendance in the New York State Veterinary College is somewhat increased. 431 degrees were conferred in June, 1897, an increase of 50 over any preceding year.

Dr. Waldemar Lindgren, of the U. S. Geological Survey, will deliver a course of lectures on mining and metallurgy at Stanford University, but has not accepted a permanent appointment, as has been announced.

Miss Julia Snow, Ph.D. (Munich), has been appointed instructor in Botany in the University of Michigan.

Dr. W. H. R. Rivers, of St. John's College, Cambridge University, has been appointed university lecturer in experimental psychology. Mr. W. L. H. Duckworth, of Jesus College, has been recognized as a lecturer in anthropology.

Mr. J. W. W. Stephens, B.A., M.B., Caius and Gonville, has been elected John Lucas Walker Student in Pathology, Cambridge University, *vice* Mr. L. Cobbett, M.A., M.B., Trinity; and Mr. H. K. Wright, M.D., C.M., McGill University, Montreal, has been awarded an exhibition of the value of £50 from the John Lucas Walker Fund.

DISCUSSION AND CORRESPONDENCE.

THE AGONOID GENUS PERCIS OF SCOPOLI.

The generic name *Percis* of Scopoli has been universally forgotten, but must be revived, and lest it should be overlooked in the great work of Drs. Jordan and Evermann I would call attention to it now. The genus for which the name was proposed by Scopoli is generally known as *Hippocephalus* of Swainson (1839). It was, however, well defined by Scopoli in 1777, and based on the *Cottus japonicus* of Pallas. The description will be found in Scopoli's 'Introductio ad Historiam Naturalem' (p. 454). The only species mentioned was *Percis japonicus*.

The genus *Percis* is the representative of a sub-family distinguished from the *Agoninæ* by the anterior position of the first dorsal fin and may be called *Percidinæ*. The other genera are *Agonomalus* and *Hypsagonus*.

Washington, D. C. Theo. Gill.

SCIENTIFIC LITERATURE.

RECENT MATHEMATICAL BOOKS.

Elements of Plane and Spherical Trigonometry. By Edwin S. Crawley, Assistant Professor of Mathematics in the University of Pennsylvania. Second edition, revised and enlarged. Philadelphia, E. S. Crawley. 8vo. Pp. 178.

In the writing of a text-book on Trigonometry there is now-a-days practically no opportunity for any assertion of individuality. The subject is of small extent, definitely bounded, and crystallized into final shape. There is, indeed, a possibility of trimming the treatment down to the absolutely indispensable part of plane trigonometry, which might then be gone over by a class in ten weeks or even less. But the whole tendency is the other way, and chapters on trigonometric equations, De Moivre's theorem, etc.—in short, a pretty complete discussion of the whole field—are now demanded in a text-book. The teacher must decide for himself how much of the whole material he will cover, and he will do well to bear in mind two facts, or rather two phases of the same fact, viz: (1) that teachers of applied mathematics constantly complain that their students do not bring to them a practical working knowledge of trigonometry; (2) that no student, however gifted or however taught, ever fully understands his elementary mathematics until he has gone through the Calculus.

Professor Crawley's book first appeared in 1890. The present second edition has been revised and enlarged by: (1) the adoption of definitions of the trigonometric functions applicable to angles of any magnitude; (2) the addition of a large number of exercises to illustrate the best methods of trigonometric reduction and analysis; (3) a large increase in the number and variety of the examples; (4) additional theorems on the described circles and Brocard's points; (5) a new chapter on De Moivre's theorem and the hyperbolic functions. A previous knowledge of logarithms is expected of the student, and the book is without tables. The plane trigonometry occupies 119 pages, and

the spherical trigonometry 51 pages. Answers are given at the end of the book, but not in cases where they would detract from the value of the examples.

Numerical Problems in Plane Geometry. By J. G. ESTILL. New York, Longmans, Green & Co. 8vo. Pp. x+144.

Of their own motion or in conformity with the unanimous recommendation of the conference of colleges and preparatory schools held at Columbia University in February, 1896, most of the better colleges have abolished the superannuated entrance requirement of a formal examination in arithmetic, and now prescribe in its stead the ability to solve numerical problems in plane geometry and a knowledge of the metric system and in some cases of logarithms. Mr. Estill's book, which is intended to furnish the requisite exercise in all three subjects, contains 49 pages of problems divided into books corresponding to the usual arrangement of the geometries in more general use. These are followed by 52 pages of recent entrance papers of an unusually large number of colleges, together with individual problems taken from similar papers. A five-place table of logarithms, with explanations and examples, occupies the next 38 pages; and the book concludes with the metric tables of weights and measures, including tables of English and metrical equivalents.

The book is not intended to take the place of other geometries, but to be used with them. The problems seem to be generally well selected. The metric system is used from the start, a favorite habit of the author being to give the data in metric units and to require the results in English measure, or *vice versa*. This is, of course, a necessary exercise within bounds, but, when carried to such an extreme as here, is calculated to give the beginner the idea that the metric system is an abominable contrivance for reckoning in terms of incommensurable numbers. Occasionally, too, the answer to a problem is conditioned on the degree of approximation to which the metric and English equivalents are to be taken, and this may well produce a feeling of uncertainty not quite in harmony with the notion of geometry as an exact science.

Plane and Solid Analytic Geometry. By FREDERICK H. BAILEY and FREDERICK S. WOODS, Assistant Professors of Mathematics in the Massachusetts Institute of Technology. Boston, Ginn & Co. 8vo. Pp. xii+371.

Wholly unlike trigonometry, analytic geometry, even in the highly restricted sense in which the name is employed by the present authors, admits of the widest variety of treatment. To what extent shall modern coordinate systems and modern methods generally be introduced? How shall the conic sections be defined? How shall the general equation of the second degree be exploited? Shall anything be said about projective relations and anharmonic ratios? These and many other questions may be settled in the greatest variety of ways by the author, and whatever his decision may be, he can with skill and care produce a highly satisfactory book.

Professors Bailey and Woods have chosen to exclude the more modern apparatus. They do not employ determinants or projective coordinates, or anharmonic ratios, but confine themselves to the ordinary Cartesian and polar coordinates and the common methods. This plan has its advantages. Beautiful and concise as the modern analytic geometry is, the beginner is perhaps not able to appreciate it at once. He must just become acquainted with a large number of new and fundamental ideas and practice himself long and slowly, before he is really able to grasp the perfect theory at all. If he learns great principles prematurely he is apt to have only a superficial understanding of them. At least this is the opinion held by many teachers.

The authors have covered the usual ground so far as plane geometry is concerned. After elementary chapters on coordinates, loci, the straight line, and transformation of coordinates follows one on the circle. The latter serves as an introduction to the conic sections, which are discussed in the next chapter on the basis of Arbogast's definition. This chapter contains also an innovation, the discussion of the general equation of the second degree with the xy term missing, a step which greatly unifies the following treatment of tangents, normals and polars. The discussion of the complete general equa-

tion occupies the last chapter of the plane geometry.

Pages 272 to 359 are devoted to solid geometry. The usual properties of the plane and line are discussed. The quadric surfaces are studied from the simplest forms of their equations, the treatment including the theory of the tangent, polar, diametral planes, conjugate diameters, circular sections and rectilinear generators. The reasoning throughout is clear and rigorous. Defects in the book are the rather scant treatment of problems in loci and the lack of good general (not numerical) examples. The book seems also disproportionately long, considering that Salmon's Conic Sections contains only 400 pages and that Smith's Conic Sections in 191 pages covers pretty well the same ground in plane geometry as the present work.

F. N. Cole.

Columbia University.

A Handbook for Chemists of Beet-Sugar Houses and Seed-Culture Farms. By Guilford L. Spencer, D.Sc. New York, John Wiley & Sons. 1897. Pp. 475.

The beet-sugar industry, one of the most important industries of Europe, has of recent years attracted considerable attention and gained a hold on the public interest in various sections of the United States.

The painstaking and exhaustive researches into the various phases of successful beet-culture pursued for some time by the United States Department of Agriculture, largely under the able direction of Professor H. W. Wiley, have resulted in making available a vast fund of valuable information bearing on the best conditions of soil, climate, etc., for the growing of sugar-beets.

A practical confirmation of the validity of the conclusions determined by these investigations is to be found in the results obtained by the several beet-sugar factories now in successful operation in California, Nebraska, New York and elsewhere in our States. The combined capacity of these factories is, at the present, estimated to be about four thousand tons of beets, daily.

Under these conditions it was felt to be desirable to have a reliable chemical guide for those entering upon the pursuit of this newly developing branch of American industry.

The Handbook for Beet-Sugar Chemists has been written by Dr. Spencer with the express purpose of meeting this need and demand.

The author, who has been connected with the United States Department of Agriculture for some years, and who has taken an active part in its researches and investigations in beet-culture, has certainly acquitted himself ably of the self-set task.

This volume is modeled closely on the lines of the author's earlier publication, 'Handbook for Sugar Manufacturers,' which is devoted almost exclusively to the cane-sugar industry.

Nearly all of the numerous tables of the earlier work are reproduced in this, and, of course, others are added to meet the requirements of the sujects specifically treated of in these pages.

Directions for sampling and averaging beets are carefully given. The optical and chemical methods of sugar-analysis are concisely and clearly described. Analysis of the beet, the juice, the syrup, of the marsecuites and molasses and the sugars, receive attention in separate chapters, as do also the analysis of bone-black, limestone, coke, etc. Proper stress is laid on the principles upon which beet-selection is based and the methods of seed-testing are fully explained. The author's style is clear and lucid; the numerous references to authorities, given throughout the book, a valuable feature.

The problem of selecting the most desirable methods from the wealth of material stored in the current technical literature is a difficult one and has been well solved by Dr. Spencer. Care has evidently been given to the proof-reading; the misspelling of the name Karcz—which is given as Kracz in both text and index—but serves, as an exception, to prove the rule. The text covers about three hundred pages; it is followed by more than a hundred pages of 'Blank Forms for Practical Use in Sugar House Work,' and some thirty pages are given to a 'Summary of Yield and Losses.' Then follows the index; in the writer's opinion it had better be placed immediately after the text, to which it refers. The book is bound in morocco;

paper and typography are very good. The insertion of advertisements, however, in a book of this kind seems, to say the least, in questionable taste.

FERDINAND G. WIECHMANN.

The History of Mankind. By PROFESSOR FRIEDRICH RATZEL. Translated by A. J. BUTLER, M. A. New York, The Macmillan Company. 1897. Vol. II., with maps and illustrations. Pp. 562. Price, $4.00.

This is the second volume of the translation of the second edition of Ratzel's 'Ethnographie,' which, for unknown reasons, the publishers have chosen to miscall 'The History of Mankind.' The first volume has already been noticed in this JOURNAL. (See SCIENCE, October 23, 1896.)

It is a handsome book, printed in clear type on excellent paper, with two maps of the distribution of the African races, ten colored illustrations of ethnographic objects and several hundred engravings in the text. These are not fancy sketches, but real helps to the student, selected from the best works of travellers or taken from authentic objects in museums of ethnography.

Professor Ratzel ranks among the chief living authorities on general ethnography, and there is no work in our tongue which surpasses this in abundance and accuracy of information. It can be recommended to readers and students without hesitation.

The present volume takes up the American Indians and the black races of Africa. The author has seen fit to interpolate between these a description of those whom he calls 'The Arctic Races of the Old World,' to wit, the Chukchis, Samoyeds, Gilyaks, Lapps, etc., usually included in the term 'Ural-Altaic Peoples.' Yet he acknowledges (p. 209) that 'we must not talk of a hyperborean race,' and intimates, what is undoubtedly the fact, that these peoples were not originally Arctic dwellers, but lived in the more genial climes to the south.

The Americans he divides, or rather meant to divide, following the artificial distinction of Waitz, into 'wild' and 'civilized' tribes; but the translator has, instead, made the distinction into 'cultured races' and 'civilized races!'—an error repeated in the table of contents and text. This unreal contrast, however, is less respected by the author in his treatment than in his plan. He recognizes the solidarity of native American culture everywhere. He also speaks positively in favor of the unity and antiquity of the race; and, with not quite so clear a note, of the independence of its culture. Nothing could more fully express a true apprehension of the American question than his words (p. 10), "Rightly understood, the New World has to supply the key to the greatest problems of anthropology and ethnology."

In details he is sufficiently full, and usually they are presented with fairness. For instance, on the mooted question of the Eskimos he decides that they are physically affined to Asian types, but in language and culture are Americans. The former is true chiefly of those in Alaska where admixture of blood may be apprehended.

His discussion of the native religions, both of America and Africa, leaves something to be desired. The time has passed when such terms as 'sun-worship,' 'moon-worship,' 'fetishism,' and the like, satisfy the student of comparative religion. These refer to externals merely and do not reveal the real religious thought. The similarities of Polynesian and American mythologies are dwelt upon (p. 147), but the translator pertinently adds in a note (p. 148) that students of Greek mythology will also 'find parallels in every part.'

It seems a deficiency to treat of totems as 'animal and plant symbols' (p. 131); they were much more than that, and often neither animal nor plant. The opinion he intimates (p. 165) that the 'Toltecs' largely created the culture of Central America is surely wide of the mark, as has been shown recently by Sapper, and his estimate of the social condition of ancient Peru (p. 201) is higher than students now would concede.

The negro races of Africa are treated with much ability. He distinguishes between the light-colored stocks, the Bushmen, Hottentots and Dwarfs of the southern and eastern parts of the continent and the Central Africans. He traces the widespread Bantu nations with precision, and gives cogent reasons for believing

their comparatively recent migration into the greater part of their present territory. The Dwarfs he considers anthropologically connected with the older inhabitants of the land and with the southern light stocks. The maps show, the one the limits of the civilizations of Africa, the other the localization of its numerous stocks. They are carefully drawn and useful.

The publication of the English version of this standard work should stimulate the study of this important branch of science. Though too large for a text-book, as a work of reference it should be in every educational library.

D. G. Brinton.

University of Pennsylvania.

Bau und Leben unserer Waldbäume (Structure and Life of our Forest Trees). By Dr. M. Büsgen, Professor at the Forest Academy at Eisenach. Jena, Gustav Fischer. 1897. 8vo. Pp. 230.

This timely book fills a long-felt want and is, we believe, the first and only publication in any language which has ever attempted separately and in extenso and yet concisely to bring together all our knowledge of the structure and physiology of this most important group of plants; R. Hartig's and J. C. Müller's Handbooks coming next to such an attempt. This book deals, as the title indicates, with the arboreal forms of Germany; but as these are typical of all temperate zones, and the discussion is of general laws and does not refer to any particular species, it covers our own needs in this field. It is written, as the preface states, "to facilitate orientation for botanists and foresters and for all those non-professionals who desire to obtain an insight into the life and working of our forests."

From this we should not, however, anticipate that the subject has been treated in that 'popular' method of presentation which is characterized by lack of thoroughness and an attempt to please by selection rather than to instruct fully. On the contrary, the book is written in a thoroughly scientific spirit, with due regard to completeness and to the relative importance of the various parts of the subject, albeit here and there treated somewhat scantily.

The author, formerly professor at the University of Jena, has evidently brought to his task not only a thorough knowledge of the literature on the subject, at least the German and French, to which he closely and copiously refers in all particulars, but has compiled the facts with critical judgment.

Having been accustomed by his position to present the subject to a class of students who are trained to make practical use of the same in their professional pursuits, he has known how to lay most weight on the essentials from that point of view. If we add that the diction is simple and the literary style pleasing, we have given all the points that make a good and useful book. Even the usual deficiency of German books, the absence of a full index, is, in part at least, overcome by a 'register of matters not readily to be found through the table of contents.' How very deficient this register is may be illustrated by one example: Although in the chapter on causes of tree form, under the caption 'The Wind,' frost phenomena of arctic regions are discussed—and nowhere else—the index contains no reference under 'frost,' and certainly the table of contents would hardly lead one to the place. The disposition of the material appears often not very logical and hence an index is so much the more desirable.

Lack of space forbids us to go into a critical review in detail. We may only give an idea of the contents by giving titles of chapters. 'The Winter Aspect of Trees' is the title of the first, followed by 'Causes of Tree Form' as the second chapter. These two chapters could, with the aid of N. J. C. Müller's painstaking—unfortunately much overlooked—work have been profitably enlarged. The chapter on 'Buds' is followed by 75 pages devoted to the body of the tree in six chapters, discussing the 'character and functions of the formative tissues of the tree,' 'the elements of the woody tissue' and 'the bark,' the 'annual ring,' 'structure and weight of wood and heartwood formation.' The 'foliage' and 'the root' have each a large chapter devoted to them.

In the chapter on the 'Water Supply of the Tree' we note a curious misconception of an interesting experiment of Strasburger's, into which the great experimenter himself seems to

have been misled, resulting in the statement that 'the living cells of the wood do not take part in the water conduction.' The absurdity of this conclusion, philosophically apparent, can easily be demonstrated by experiment. While as a rule the unfortunate lack of knowledge of the physiology of trees is everywhere acknowledged, it appears to us that with regard to this most difficult problem the writer allows himself to become over-sanguine when he thinks that Dixon and Joly, and Askenay have solved it, however much they may have done to bring the matter under the scrutiny and explanation of physical laws and physical forces.

A chapter on the 'Derivation and Significance of the Mineral Food Elements in Trees' is followed by one on the 'Transformation and Transmission of Food Materials in the Tree,' and a chapter on 'Something about Flowering, Fruiting and Germination' ends the whole somewhat lamely, the necessity of space limitation working disadvantageously in this chapter.

The professors and students of forestry in this country, which are beginning to be called for by our necessities, will find a most convenient compendium of tree physiology in this handbook.

B. E. FERNOW.

Beiträge zur Kenntniss der Septalnectarien. Von J. SCHNIEWIND-THIES. Jena, G. Fischer. 1897. Mit 12 lithographischen Tafeln. Pp. 87.

As is well known, ovarial nectaries are confined to the Monocotyledons, occurring in the Liliifloreæ and in the Scitamineæ. The authoress has made a comprehensive and thorough investigation of these, as the result of which she distinguishes seven different types of nectaries, the simplest of which occur in those genera which stand lowest in the scale of development. The development of the complex out of simpler types can be followed through a series of forms which show strikingly how the development of the vascular bundle system has gone hand in hand with that of the nectary and how the secreting power of the cells has increased in the more complex forms.

In the simplest cases the secretion of nectar takes place all over the surface of the ovary. Next we find the nectaries confined to lines which correspond to the septa and more or less depressed in clefts and furrows. In the higher types we find the nectaries in the interior of the ovary, always occurring in the septa and discharging their secretions by means of an opening which reaches the surface. These internal nectaries are often of complicated structure and may or may not be accompanied by nectaries located on the surface.

The structure of septal nectaries was investigated in a large number of genera belonging to the Liliaceæ, Amaryllidaceæ, Iridaceæ, Musaceæ, Zingiberaceæ, Cannaceæ, Marantaceæ and Bromeliaceæ.

The behavior of nucleus and cytoplasm in the secreting cells was also investigated. During the development of the ovary the secreting cells gradually become differentiated from the ordinary parenchyma cells; their cytoplasm becomes denser and they are very poor in starch, while the parenchyma cells contain an abundance of it. The nuclei of the secreting cells increase in size and become much richer in chromatin than the nuclei of the parenchyma cells; the number of nucleoli often increases. As soon as the differentiation of the tissues of the ovary is complete the secreting cells give a strong reaction with Fehling's solution. Their nuclei in many cases partially lose their walls and assume various constricted, branched and other irregular shapes. The nucleoli diminish in number, size and staining power, except in certain cases, where the reverse takes place.

During the period of their greatest functional activity the secreting cells use up starch stored in the neighboring parenchyma cells. Their cytoplasm gradually diminishes and often disappears completely. The irregular nuclei become still more irregular and often lose their walls entirely. In most cases the chromatin and nucleoli are more or less completely dissolved, but sometimes the chromatin remains intact. The colored plates illustrating changes in cell-structure are of much value, but leave much to be desired in finer details. Some experiments made by the author seem to show that a diastatic ferment is present in the nectary and its secretions.

The comprehensive and thorough investigations of Frau Schniewind-Thies constitute an

important contribution to our knowledge of the anatomy and physiology of septal nectaries and of nectaries in general. Especial mention should be made of the twelve excellent lithographic plates which illustrate nectaries in position in the flower, cross and longitudinal sections of ovaries and nectaries and the details of cell-structure in the secreting cells.

W. J. V. Osterhout.
University of California.

The Living Substance as Such, and as Organism. By Gwendolen Foulke Andrews (Mrs. Ethan Allen Andrews). Supplement to Journal of Morphology, Vol. XII., No. 2. Boston, Ginn & Company. The Athenæum Press. 1897.

This work is devoted principally to discussing the more general questions of biology in the light of the very interesting facts ascertained by the examination of *living* protoplasm under the highest powers of the microscope—a method that of late has fallen into undeserved disrepute, especially so far as metazoa are concerned. Bütchli's theory of the foam-like structure of protoplasm is adopted and a number of additional observations tending to put it on a firmer foundation are recorded. The term 'Bütchli's structure,' however, is used in a sense that would probably not be subscribed to by this investigator, as designating not the foamy structure of protoplasm in general, but merely the foam whose alveoli are from ½ to 1 micron in diameter, excluding the coarser vacuolations on the one hand and on the other the 'finer foam' discovered within the substance of the partitions between the alveoli. It is to this finer foam that the principal rôle in the activities of the living substance is ascribed. The simpler movements, such as amœboid flowing seem to have for their especial organ the 'structure of Bütchli,' but the modifications of these processes, such as those taking place in the minute filose pseudopodia of many protozoa and the more complex activities of protoplasm in general, depend upon the finer foam. By this means the way is pointed out for a reconciliation of the alveolar and fibrillar theories of the structure of protoplasm. True fibres are actually found in the cell in mitosis, and at other times, but from their activities these are considered to be made up of the finer foam and to be frequently comparable to filose pseudopodia, except that they are formed on the inside of the cell.

With this structure as a basis the more general questions are considered and an interesting point of view arrived at. The important thing everywhere is the 'continuous substance' separating the alveoli. The cell is but a differentiation of this, presided over by a metabolic organ, the nucleus. In the living metazoan cells are constantly seen to be connected by a most changeable host of filose pseudopodia along which visible exchange of material may take place. Metabolism is merely a means for furnishing the 'continuous substance' with the proper internal environment, and the organism an accidental organization of it for the purpose of acting upon the external environment and thus furnishing the proper internal surroundings. Heredity is a provision of the substance for the future essentially similar to, though more complex than, the provision for a future internal environment made in injecting food. Thus the necessity for complex theories of transmission vanishes and the study of the structure and activities of the 'continuous substance' becomes of paramount importance.

Unfortunately, the poor style makes the reading much more difficult than the subject warrants. Facts and theories are mixed, unusual constructions are frequent, and in the purely descriptive parts even ambiguous expressions are encountered. That this lack of clearness is apparently due to careless composition seems to be shown by occasional sentences like the following from page 115: "If by coalescence, the substance as such showed respect to that position in the mass in which it newly found itself, exactly as in each individual it had through all its ceaseless flux respected its relative position; for it must not be forgotten that in these protoplasts the substance as such is ever changing its position in the mass or organism."

System der Bakterien, Handbuch der Morphologie, Entwickelungsgeschichte und Systematik der Bakterien, Band I., Allgemeiner Theil. Von Dr. Wm. Migula, a. o. Professor an der

technischen Hochschule zu Karlsruhe. Jena, Verlag von Gustav Fischer. 1897. Octavo of 368 pages, illustrated by 40 photographic reproductions and one diagram.

The volume before us represents the first section of a work on bacteriology. It opens with an instructive critical review of those investigations that have played so important a part in the development of our knowledge of the subject, especially as concerns morphology, classification, etc., dwelling at some length upon the historic works of Leeuwenhoek, O. F. Müller, Ehrenberg, Dujardin, Perty, Cohn, Nägeli, and DeBary.

The second section contains a discussion of the morphology, structure, modes of development and reproduction, chemical constitution, and metabolic activities of bacteria; while the third section is devoted to brief considerations of certain specific biological functions of bacteria—such, for instance, as their relation to culture media, their chromogenic functions, their specific properties of fermentation, anærobiosis, phosphorescence, and their relation to light and to temperature.

It is an excellent presentation of these phases of the subject, especially the section relating to the finer structural details of bacteria. Indeed, this portion of the work is particularly elaborate, the subject being treated with much more detail than is usual. In this respect it may serve to satisfy the demands so frequently made by the botanists for more attention on the part of bacteriologists to the morphological side of bacteriology. We must confess ourselves, however, to be of the number who not only find greater entertainment and instruction from the study of the biological functions of bacteria, but who also believe this to be much the more important line along which to develop the work.

This volume contains no reference to the relation of bacteria to the more highly-organized beings, and comparatively little upon their important rôle in the great processes of nature—points that will doubtless receive due attention in the forthcoming second volume of the work.

The literary references are full and are conveniently grouped at the end of each chapter in alphabetical order.

A. C. ABBOTT.

SOCIETIES AND ACADEMIES.

THE 97TH REGULAR MEETING OF THE CHEMICAL SOCIETY OF WASHINGTON, NOVEMBER 11, 1897.

THE first paper of the evening, read by Dr. H. C. Bolton, was entitled 'Hysterical Chemistry,' a term which he applied to the preposterous theories and claims of a certain small group of writers on chemistry who call themselves Monists. They advocate unity of matter and reject identity, replacing the latter by analogies. He gave examples of their method of reasoning, one instance being the following:

"An atom is a hypothesis,
A hypothesis has no weight, therefore
Atomic weight is a nonentity."

The speaker showed that these writers did little or no experimental work, yet claimed to be revolutionizing chemistry by their publications; also that they deserve no serious consideration.

Mr. Wirt Tassin's paper, entitled 'The Preparation of Crystals,' consisted of a review of the several methods of preparing crystals for the determination of their geometrical and physical constants, the methods being grouped under the following heads:

A. Solution, treating of the preparation of crystals of a substance from its solution in a liquid by evaporating and cooling the solution; by the reaction of soluble compounds, or by chemical changes in general. The general rules to be observed being:

1. The crystallization must proceed as slowly as possible.

2. The solution must be of the least viscosity possible.

3. The crystallizing substance must be present in the solution in the greatest quantity.

4. The crystals desired for measurement must be removed from the solution, preferably when it is at its minimum temperature, and must be quickly and completely dried in order to prevent corrosion or etch figures forming.

B. Sublimation, in which case the crystals may be obtained direct, or a non-volatile compound may be obtained as a result of chemical action between two or more volatile substances, or from a volatile substance and a gas.

C. Fusion, where the crystals are secured by slowly cooling a homogeneous magma, or by a